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Marketing efficiency of organic garlic and potatoes in Gasa district of Bhutan

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ABSTRACT: This study was carried out with the objective of looking at the marketing efficiency of organic garlic and potatoes in Gasa district. Applying a simple random sampling method, 60 farmers from Goenkhamed and 30 farmers from Goenkhatoed villages under Gasa district were involved in the study. The findings of the study were based on production and marketing data for 2020-2021 season of garlic and potato. The study employed Shepherds and Acharya-Agarwal's modified method to find the marketing efficiency of garlic and potatoes. Of the three popular channels of marketing prevalent in the study area viz 1) Farmers to consumers, 2) Farmers to retailers to consumers, and 3) Farmers to wholesalers to retailers to consumers, garlic farmers preferred channel 3 while potato channels preferred channel 1. From efficiency analysis, channel 1 was found to be the most efficient channel for garlic and potatoes. To reduce losses resulting from post-harvest handling of garlic and potato, farmers should be provided technical support and training on storing and post-harvest technology. Additionally, farmers are recommended to work in groups to reduce marketing or any other related costs while marketing organic vegetables. The government should invest in improving road connectivity and putting in place an efficient and reliable transport system to make the marketing channels more efficient and convenient for both farmers and consumers.

Keywords: organic vegetables; marketing channels; marketing efficiency; Shepherds method; Acharya-Agarwal's modified method

Introduction

Vegetables are a very important part of the everyday diet for all human beings. The minerals, vitamins, and fiber contents in vegetables play important roles in keeping humans healthy and preventing various forms of diseases (Asaduzzaman and Asao, 2018). Besides providing nutritional requirements for the vegetarian populace of the nation, it also serves as the major employer as the agriculture sector employs 55.99% (O'Neill, 2023). Bhutan produced 102,868 metric tonnes of vegetables in 2021 while the production in 2013 was 64,115 metric tonnes indicating an increase of 60.44% (National Statistics Bureau [NSB], 2015, 2022). This has led to the export of 29,791.42 metric tonnes which is an increase of 37.07% compared to 2015 (NSB, 2017, 2022). Amongst the vegetables, potato is the most popularly consumed as well as exported vegetable from Bhutan (Rai et al., 2021).

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From the production of 43,560 metric tonnes, 26,050 metric tonnes were exported to India and 20 metric tonnes to Bangladesh in 2019 (MoAF, 2019a, 2019b). Similarly, garlic is grown as another important cash crop by farmers across the country. In 2021, the production of garlic from Bhutan was 240.25 metric tonnes (NSB, 2021). Thus, potatoes and garlic have come out to be the important crops for the Bhutanese population.

Marketing of agricultural products is another important aspect besides production. The availability of vegetables in the markets can be assured through an efficient marketing system in place. In the Bhutanese context, Food Corporation of Bhutan Limited (FCBL) plays the major marketing platform for agricultural products, especially vegetables and fruits (FCBL, 2023) while other local markets in the country play an equal role in the distribution of agricultural products. Agricultural marketing involves the procedures and strategies employed to facilitate the effective distribution and trading of agricultural goods within the supply chain (Rajendran and Karthikesan, 2014). The efficiency within an agricultural marketing system can be observed when farmers are able to sell their produce at fair returns, that leads to improved living conditions and standards within the farming community (Smith, 1992). Efficient agriculture markets reduces cost of marketing, stables the output and prices, and removes the unfair consumer's price (Dukpa and Ezung, 2020). Agriculture marketing encompasses various activities such as planning production, growing and harvesting, grading, packing and packaging, transport, storage, and sale of agricultural products (Dastagiri et al., 2013; Food and Agriculture Organisation [FAO], 2023b). In case the marketing system is inefficient, it will lead to higher marketing cost and losses to the farmers. Some studies on agricultural marketing were carried out in the past that include marketing agricultural products that focused on Bhutanese market interests (Bhatia and Bhattacharya, 1990), smallholder farmers' marketing issues in Eastern Bhutan (Pema et al., 2020), and linking small farmers in Bhutan with markets (Tobgay and McCullough, 2012). However, none of these studies have a focus on the marketing efficiency of different agricultural products. Thus, this study was aimed to study the marketing efficiency in marketing of organic garlic and potatoes from Gasa district of Bhutan. The findings of the study would help to reduce inefficiencies in the distribution of agricultural products and lower consumer prices and higher producer incomes. Further, it will help policymakers and stakeholders in making informed decisions to improve market structures and promote economic development in the agricultural sector.

Materials and Methods

Study Area and Data Collection

Bhutan is administratively divided into twenty districts. The study was conducted in Gasa district **(Figure 1)**.

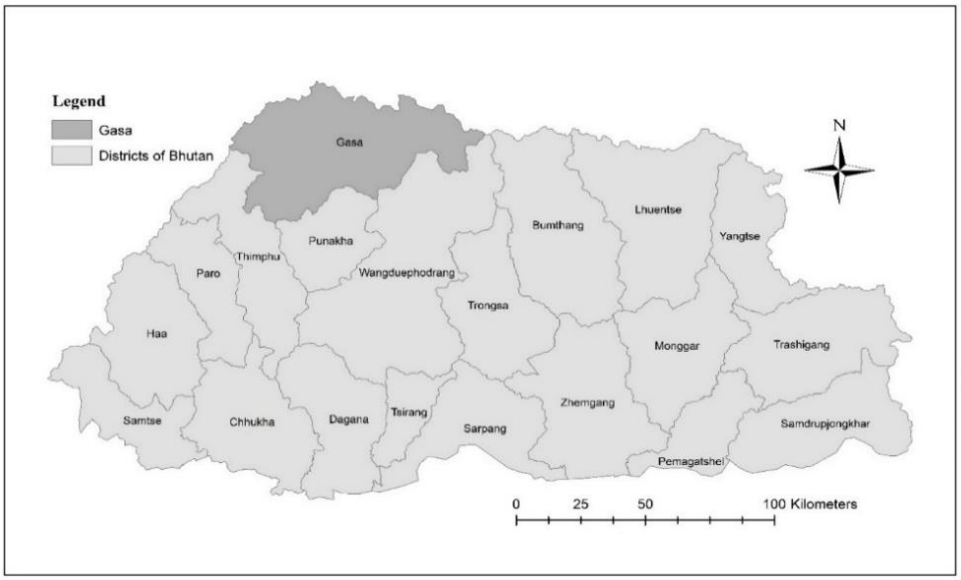

Figure 1 Map of Bhutan with highlighted study area

Courtesy: Dr. Ugyen Thinley, Assistant Professor, Royal University of Bhutan

Gasa district is in the northwest of Bhutan with altitude ranging between 1,500 and 4,500 masl and experiences long and cold winters and short summer. Gasa is bordered by the autonomous region of Tibet (China) in the North and Thimphu, Punakha, and Wangduephodrang in the South. The district has an area of 3,117.74 km^2 (1,203.77 sq miles). The district is further divided into four *Gewogs* for local administration namely Laya, Lunana, Goenkhatoe, and Goenkhame respectively. Gasa has a population of 3,952, is one of the least densely populated Dzongkhag in the country (Gross National Happiness Commission [GNHC], 2019).

The highland communities under Laya and Lunana *Gewogs* were solely dependent on yak rearing in the past. However, with the legalisation of collecting cordyceps in 2004 through the Royal Decree, they now have an additional livelihood options (Wangchuk and Wangdi, 2015). Nevertheless, agriculture still remain as the mainstay for other two subdistricts of Goenkhatoed and Goenkhamed (GNHC, 2019). Thus, these two subdistricts were considered for this study **(Figure 2)**.

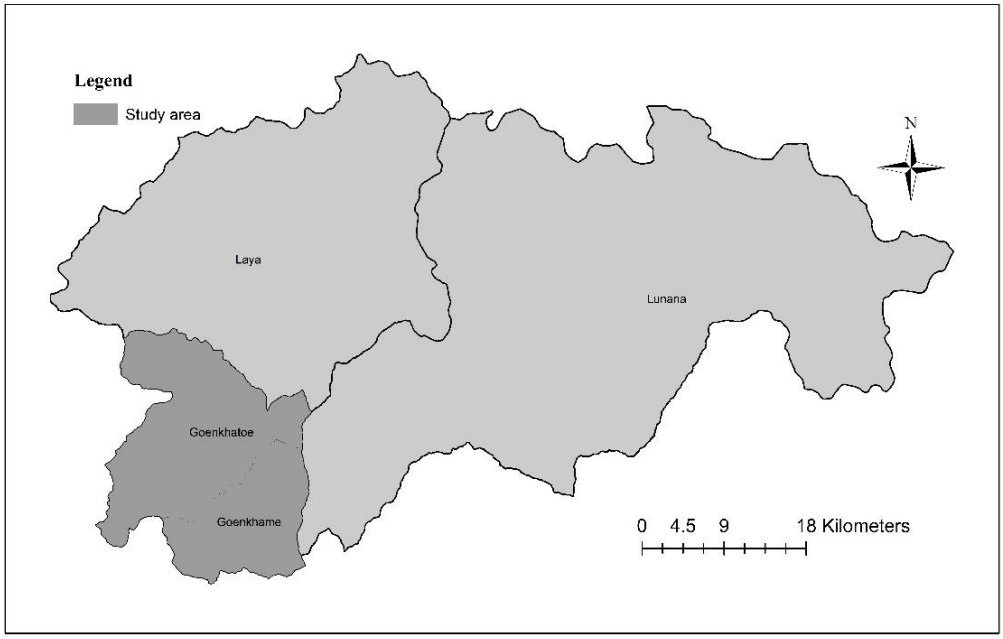

Figure 2 Map of Gasa district highlighted with two study areas.
Courtesy: Dr. Ugyen Thinley, Assistant Professor, Royal University of Bhutan

Ninety farm households from Goenkhatoed and Goenkhamed blocks were randomly selected and interviewed for this study. Amongst the sampled households, thirty farm households from Goenkhatoed were members of the Gasa Rangzhin Sanam Detshen. Gasa Rangzhin Sanam Detshen is the first certified organic vegetable farmers' group in Bhutan. The name Gasa Rangzhin Sanam Detshen represents ("Gasa" -the name of the district, "Rangzhin" – natural, "Sanam" – agriculture, and "Detshen" – group). The group was formally registered with the Department of Agriculture Marketing and Cooperatives under the Ministry of Agriculture and Forests (MoAF) since 9 August 2015. The Bhutan Agriculture and Food Regulatory Authority (BAFRA) under the Ministry of Agriculture and Forests declared Gasa Rangzhin Sanam Detshen as organic certified farmers' group after testing potato and garlic as per the Bhutan Organic Certification System (BOCS) Guidelines, 2013, on 10 October 2016. In the following year, the carrot was also included in the organic vegetable taking the total certified organic vegetables to three on 11 August 2017. The members of the group were spread across five villages of Choli, Mani, Remi, Tsebgang, and Tserkikha under Goenkhatoed subdistrict.

Sixty sampled farm households from Goenkhamed block were spread across Damji, Gayza, Jabisa, and Khailo villages. Gasa district was purposely chosen for the study because the district was the first district to be declared organic (Duba et al., 2008) and the district is running into 14 years of experience in organic farming (Wangmo and Iwai, 2018). Garlic and potatoes were selected for the study as these vegetables were among the first certified organic vegetables in the district as well as important cash crop in the study area (Gyeltshen, et al., 2023; Lepcha et al., 2021; Mahat, 2017). The primary data was collected through a pretested survey questionnaire and face-to-face interview. The pretesting was conducted with farmers who exhibited comparable farming characteristics. This process facilitated the refinement of the survey questions, taking into account the input

received from both the interviewees and the enumerators. Secondary data for this study was gathered from various published sources such as Statistical Year Books, Annual Reports, and websites.

Data Analysis

Marketing Cost:

Marketing costs include all the related costs such as labour, transport, packaging, rent, utilities, advertising, selling expenses, and interest charges until the agricultural products reach from farmers to the consumers (FAO, 1997). Total marketing cost was calculated using the following formula (Butt et al., 2022):

$$C = C_F + C_{m1} + C_{m2} + \ldots\ldots\ldots\ldots C_{mi} \quad (1)$$

Where;

C = Total cost of marketing, C_F = Marketing cost borne by farmer, and C_{mi} = Marketing cost sustained by i^{th} middleman.

Producer's Price:

It is the price determined at the farm gate or at the first point-of-sale when farmers participate in their capacity as sellers of their own products (Food and Agriculture Organisation, 2023a). In other words, it is the net price the farmers receive after deduction all marketing costs. The producer's price was obtained using the following formula (Butt et al., 2022):

$$P_G = P_W - C_G \quad (2)$$

Where;

P_G = Producer's price; P_W = Wholesale price in the primary assembling market; and C_G = Marketing cost sustained by farmers.

Marketing Margin:

The marketing margin is the difference between the price at which agricultural products are purchased from farmer and the price at which it is sold to the consumer. It is ascertained base d on the following formula (Hussain et al., 2013):

Marketing Margin = Sales Price - Cost of Goods Sold - Marketing Costs

Price Spread:

It is the difference between the sale price and purchase price of agricultural products from the farmers. It can determined with the following equation (Butt et al., 2022):

$$P_S = S_P - P_P \quad (3)$$

Where;

P_S = Price spread; S_P = Sale price; and P_P = Purchase price

Marketing efficiency

There are several methods for measuring marketing efficiency in agriculture. Some of these methods include Gross Marketing Margin (GMM), Marketing Cost Ratio (MCR), Marketing Efficiency Ratio (MER), Marketing Profitability Index (MPI), and Relative Marketing Efficiency (RME). Each of these methods has its own strengths and weaknesses, and they may be more appropriate for different situations.

For instance, Gross Marketing Margin (GMM) measures the difference between the total revenue generated from the sale of an agricultural products and the total cost incurred while producing and marketing it (FAO, 1997). The method is useful for assessing profitability. However, it does not consider fixed costs such as rent, salaries, and depreciation. Furthermore, it presumes that all agricultural products are sold at the same price, which is not true in the real market situation.

Marketing Cost Ration (MCR) measures the ratio of marketing costs to the total value of agricultural products marketed. This method provides a measure of the efficiency of marketing activities by comparing the costs of marketing to the value of the output. A lower MCR indicates that a product is generating more revenue than it costs to market it, while a higher MCR indicates that a product is not generating enough revenue to cover its marketing costs (United Nations Statistical Commission [UNSC], 2016).

Marketing Efficiency Ratio (MER) is a metric used to measure the overall efficiency of a business's marketing ecosystem. It is calculated by dividing the total revenue generated by the business through marketing activities by the total marketing expenses incurred (Leblanc, 2023). This ratio is used to measure efficiency of agricultural marketing activities such as advertising, promotion, and sales that in turn helps farmers to identify the most suitable and profitable marketing channels.

Marketing Profitability Index (MPI) is a ratio of the gross margin to the marketing cost that is expressed in percentage (Michigan State University [MSU], 2023). It is used to evaluate the profitability of different marketing channels and identify areas for improvements thereby enabling the farmers to the best channels.

However, Shepherd's Market Efficiency and Acharya-Agarwal's modified methods were found more appropriate with the current study.

1. **Shepherds Market Efficiency method** (Shepherd and Futrell, 1969): It is the function of total value of goods (price) paid by the consumers and the total marketing cost incurred.

$$ME = \frac{V}{1} - 1 \quad (4)$$

Where,

ME = Marketing efficiency; V = Price paid by consumer (value of goods purchased); and I = Total Marketing Cost (Cost + margins).

2. **Acharya-Agarwal's modified method** (Acharya and Agarwal, 2014): In this method, it is the function of total marketing costs, net marketing margins, price received by the farm households and price paid by the consumers.

$$MME = \frac{NPp}{MC+MM} - 1 \quad (5)$$

Where,

MME = Modified Measure of Marketing Efficiency; NP_P = Net Price received by the farm households (US$/q); MC = Marketing Cost; and MM = Marketing Margin.

3. Marketable and Marketed surplus:

The term marketable surplus refers to the quantity of an agricultural product that remains for sale in the market after the producer has met their requirements for consumption and seed from their stock (Osugiri et al., 2018). In other words, it is the portion of the total output produced by a farmer that they can sell in the market The formula to calculate the marketable surplus is expressed as under:

Marketable Surplus = Production – Total overall consumption

On the other hand, marketed surplus is the portion of production that enters the market after deducting farmer's requirements for family consumption, seed, and other post-harvest losses. It can be derived using the following formula:

Marketed Surplus = Marketable Surplus – Total Post Harvest Losses

Results and Discussion

Socioeconomic characteristics

The results of the socioeconomic characteristics of the respondents were presented in **Table 1**. The age of organic farmers ranges from 26 to 75 with mean of 48.78 years. Among the respondents, a majority comprising 77.8% were female, while the remaining 22.2% represented male respondents. The study revealed the low literacy rate in the area with 72.2% of the respondents being illiterate. In terms of the family members, the average family size was 3.69 with a maximum of 11 and minimum of 1 member. The households on average has the annual income of US$ 936 derived from both farming and off-farm activities. Family size is important in the agrarian society as it helps in the labour for agricultural activities. Farmers own an average of 2.65 acres of land. As farmyard manure being very important component of organic farming, the respondents on average owned 6 cattle heads. In 2020-2021 cropping season, the respondents utilized on average 0.19 acres for garlic and 0.43 acres for potato respectively.

Table 1 Socioeconomic characteristics of farmers

Variables		F	Mean	SD	Min	Max
Age	(Years)		48.78	12.509	26.00	75.00
Gender	Male	20 (22.2%)				
	Female	70 (77.8%)				
Literacy	Literate	65 (72.2%)				
	Illiterate	25 (27.8%)				
Family members	Numbers		3.69	1.935	1.00	11.00
Family Landholding	Acres		2.65	1.794	0.25	10.00
Income	US$		936.00	748.00	258.00	4,825.00
Cattle owned	Numbers		6.15	3.388	1.00	20.00
Garlic area	Acres		0.19	0.173	0.01	1.00
Potato area	Acres		0.43	0.407	0.02	2.50

Marketable and Marketed Surplus

Marketable surplus refers to the overall quantity of agricultural products that remains available for sale once the immediate basic needs of the producers have been met (Pramanik and Prakash, 2010). As a subsistence farming society, the farm households keep part of the produce for family consumption as well as seed for the next season. Total production, marketable surplus, and marketed surplus of organic garlic and potato were presented in **Table 2**. The respondents produced 9,174 kg of garlic and 72,841 kg of potato in 2020-2021 cropping season. The marketed surplus for garlic accounted for 65.45% and 75.85% for potato from the total production. That way, the postharvest losses of garlic was 9.0% and potato was 3.7% in the study area. Such losses were true in other studies too (Porat et al., 2018; Kumar et al., 2006; Elik et al., 2019). The postharvest losses are caused by improper harvesting, poor storage facilities and packaging, and transportation. The incidence of losses in the study area were found to be due to poor storage technology and facilities.

Table 2 Total production, marketable, and marketed organic garlic and potatoes in Gasa district

Particulars	Garlic	Potato
Total Production (kg)	9,174.00	72,841.00
Marketable Surplus (kg)	6,600.00	57,376.00
	(71.94%)	(78.77%)
Marketed Surplus (kg)	6,004.00	55,253.00
	(65.45%)	(75.85%)

Marketing channels

The distribution patterns of organic garlic and potato from Gasa were presented in **Figure 3**. Channel 1 represents the farmers' sale of garlic and potatoes directly to consumers. In Chanel 2 there are retailers who buy from farmers and resale it to the end consumers. The third channel has wholesalers and retailers who play the role of intermediaries between farmers as producers and end consumers. Amongst the three channels specified, the majority (49.08%) of the garlic farmers sold most of their produce through channel 3, followed by 33.09% through channel 1. In the case of potato farmers, the most preferred was channel 1 (46.76%), followed by 42.87% respondents, which agrees with the findings of Nwafor (2021).

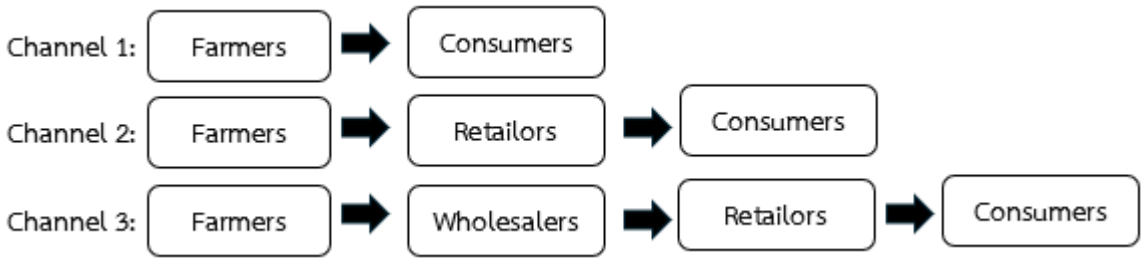

Figure 3 Marketing channels of organic garlic and potatoes from Gasa

Marketing Cost and Margin, Producer's Net Price, Consumer Price, and Price Spread

Marketing cost, margin, producer's net price, consumer price, and price spread of organic garlic and potato from study area were presented in **Table 3**. Marketing cost includes the sorting and packaging, transportation, selling, and administration (Hardesty and Leff, 2010). Unlike in the general marketing system where middleman such as wholesaler or retailers bear the major costs of marketing, farmers in the study area bear the major chunk of marketing costs. The study revealed that the marketing cost incurred on farmers were caused by the small-scale nature of the farmers producing organic garlic and potatoes. This finding corroborates with the study by Uematsu and Mishra (2012). The marketing costs include purchase of bags for packaging, sorting, packaging, transportation, and sales expenses. There were variations in the cost of marketing of garlic and potato across three channels in the study area. The calculations were done based on what portion of the consumer price is being incurred as marketing cost for both organic garlic and potatoes. It was observed that the cost of marketing in channel 1 was less for both organic garlic (3.29%) and potatoes (7.80%) respectively. This was because of no cost incurred on packing material and labour for packing organic garlic, and minimal expenses incurred on packing materials and labour for packing organic potatoes against the total quantity sold through this channel. Amongst the three channels, the marketing cost was higher in channel 2 for both organic garlic and potatoes. The higher marketing cost can be attributed to the various marketing cost components reflected, which is also true in the study by Hardesty and Leff (2010).

Table 3 Marketing efficiency of organic garlic and potatoes of Gasa district (US$/Total quantity sold)

Particulars	Channel 1		Channel 2		Channel 3	
	Garlic	Potato	Garlic	Potato	Garlic	Potato
Marketing Costs:						
Transportation	39.00	507.20	42.01	224.97	115.70	929.96
Packing Materials		67.63	21.01	30.00	57.85	123.99
Labour Packing		19.63	13.09	19.63	13.09	32.72
Labour Sales	65.00	196.31	6.54	6.54	6.54	13.09
Total Marketing Cost	104.00	790.77	82.65	281.14	193.19	1,099.76
	(3.29%)	(7.80%)	(4.86%)	(12.50%)	(4.12%)	(11.83%)
Marketing Margin			167.90	224.97	854.29	1,549.93
Value added by marketing system	104.00	790.77	250.55	506.11	1,047.47	2,649.68
Producers' Net Price	3,055.28	9,353.32	1,450.73	1,743.59	3,638.18	6,649.88
	(96.71%)	(92.20%)	(85.27%)	(77.50%)	(77.65%)	(71.51%)
Consumer Price	3,159.28	10,144.09	1,701.27	2,249.71	4,685.66	9,299.57
Price Spread	104.00	790.77	250.55	506.11	1,047.47	2,649.68
	(3.29%)	(7.79%)	(14.73%)	(22.50%)	(22.35%)	(28.49%)
Marketing Efficiency						
Shepherd's Method	30.38	12.83	6.79	4.45	4.47	3.51
Acharya-Agarwal Method	29.38	11.83	5.79	3.45	3.47	2.51

The marketing margin serves as a basis to assess the efficiency of the marketing process, encompassing a spectrum of intermediary costs and the profits added by intermediaries throughout the transfer of agricultural products from producers to consumers. Higher margins and other related costs in marketing led to less efficient marketing. There was no marketing margin with Channel 1 as farmers as producer had direct link with end consumers. However, the margins were higher in Channel 3 where there were more intermediaries. In terms of the producers' net price, farmers selling the vegetables through Channel 1 received a higher share of price, 96.71 and 92.20 percent for garlic and potato respectively. The higher share in this Channel 1 was due to non-existence of price spread. The producers net price dropped in Channel 2 and 3 in the study area with 85.27% and 77.65% for garlic and 77.50% and 71.51% for potato respectively. These happened due to the existence intermediaries' margin as well as marketing cost incurred in the process. The price spread for garlic were 14.73% and 22.35% in Channel 2 and 3 respectively of the total cost. Potato observed the price spread of 22.50% in Channel 2 and 28.49% in Channel 3.

Marketing Efficiency

Marketing efficiency assessed employing Shepherd's and Acharya's modified methods were presented in **Table 3**. Efficiency index for organic garlic in Channel 1 through Shepherd's method was 30.38, followed by 6.79 and 4.47 in Channel 2 and 3 respectively, which indicates that Channel 1 is most efficient for marketing of organic garlic. Scores from Acharya's method also showed a similar trend where Channel 1 has 29.38, Channel 2 5.79, and 3.47 in Channel 3.

Shepherd's efficiency score for organic potato were 12.83, 4.45, and 3.51 in Channels 1, 2, and 3 respectively. Following the Agarwal's method, the scores in Channels 1, 2, and 3 were 11.83, 3.45, and 2.51 respectively. This indicates that Channel 1 is the most efficient channel for the sale of organic potatoes too. The findings were in consonance with the studies by Adenuga et al. (2013); Dukpa and Ezung (2020); Mnukwa et al. (2023); Waluyo et al. (2021).

The study found that the relative inefficiency or drawbacks of distribution channels 2 and 3 were because of higher transportation charges. Respondents reported that there were no regular transporters who transport agricultural products from the study area to other markets in Bhutan due to poor motorable road connections. Further, less production volume of organic garlic and potato to be another reason for not having regular intermediaries or transporters who engage in buying or transporting vegetables from the study area. Transport could be arranged only when full load could be assured. Farmers used bus service to transport garlic and potatoes at US$ 1.96 for every pack of potato wt 50 kg and US$ 1.31 for every pack of garlic wt 10-15 kg to Thimphu, the capital city of Bhutan. While the concerned agencies act on improving the road connectivity and other infrastructures, farmers are recommended to work as producers' group to reduce transportation and other related costs while marketing vegetables. Such initiatives reduce costs and improve efficiency of the smallholder farming communities (Abdul-Rahaman and Abdulai, 2020; Onumah et al., 2007).

Conclusion and Recommendations

The study found that farmers have marketable surplus of 71.94% of total garlic production and 78.77% of total potato production after taking out the seeds and self-consumption from the stock. However, there were also losses in the processes leading to only about 65.45% of garlic and 75.85% of potato for sales finally. Thus, the farmers should be provided technical support and training on storing and post-harvest technology to reduce the losses resulting from post-harvest handling of garlic and potato. Majority of garlic farmers preferred Channel 3 while potato farmers were divided between Channel 1 (farmer to consumer) 46.76% and Channel 3 (Farmer to wholesaler to retailer to consumer) 42.87%. From the efficiency analysis, it was found that Channel 1 (Farmers to consumers) is the most efficient marketing channel for both organic garlic and potatoes. That was due to higher marketing and other related costs incurred in channel 2 and 3. One common major issue causing marketing inefficiency in all three channels were due to higher transportation charges resulting from poor motorable road connectivity and absence of regular transporters and intermediaries in marketing. Therefore, farmers are recommended to work in groups to reduce marketing or any other related costs while marketing organic vegetables. The government should invest on improving the road connectivity and putting in place efficient and

reliable transport system to make the marketing channels more efficient and convenient for both farmers and consumers.

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